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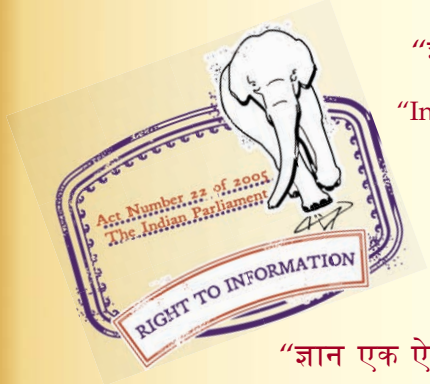

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IS : 10971 - 1984
(Reaffirmed 2006)

Indian Standard

METHOD FOR DETERMINATION OF PILLING RESISTANCE OF FABRICS

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NEW DELHI 110 002

Gr 4 *November* 1984

Indian Standard

METHOD FOR DETERMINATION OF PILLING RESISTANCE OF FABRICS

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METHOD FOR DETERMINATION OF PILLING RESISTANCE OF FABRICS

0. FOREWORD

0.1 This Indian Standard was adopted by the Indian Standards Institution on 9 March 1984, after the draft finalized by the Physical Methods of Test Sectional Committee had been approved by the Textile Division Council.

0.2 Fabrics made from certain fibres and fibre blends may develop during the course of wear tufts of entangled fibres, attached to the surface of the cloth and looking like small pills. Although a number of methods have been developed for determining the pilling properties of fabrics, it is difficult to simulate the wear conditions by any single machine. Testing of this characteristic is important especially for fabrics meant for garments like sweaters, shirts, blouses, lingeries, trousers, suits and skirts.

0.3 This standard is based on the method of test popular in the industry.

---

1. SCOPE

1.1 This standard prescribes a method for determination of pilling resistance of fabrics by tumble type pilling tester. This method may not be suitable for fabrics containing fancy yarn like slub yarn, gimp yarn and fleece yarn.

2. PRINCIPLE

2.1 The fabric samples are mounted on rubber tubes and put in a cubical box revolving at a known speed for a fixed time. The samples are then removed and compared against standards.

3. SAMPLING

3.1 The samples for test shall be drawn as laid down in the material specification or as agreed to between the buyer and the seller. The samples drawn shall be representative of the lot.

4. ATMOSPHERIC CONDITIONS FOR CONDITIONING AND TESTING

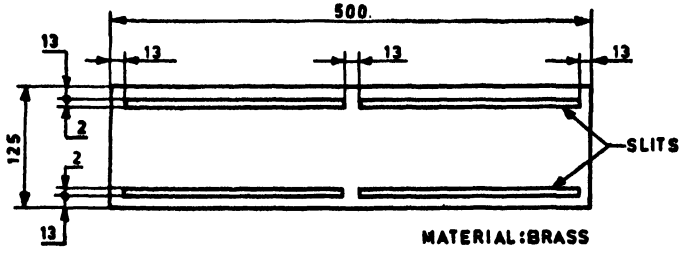
4.1 The samples shall be conditioned in the standard atmosphere at 65 ± 2 percent relative humidity and a temperature of 27 ± 2°C as laid down in IS : 6359-1971*. The test shall also be carried out in the standard atmosphere.

5. APPARATUS

5.1 Tumble Pilling Tester — having cubical boxes of 225 mm internal side length. The inner walls of the boxes shall be lined with 3 mm thick cork lining. The mass/cm² of the cork lining shall be 0·085 g. The boxes shall be capable of rotating at a constant speed of 60 rev/min about a horizontal axis passing through the centres of two opposite faces. The tester shall be provided with arrangements for stopping it after pre-determined number of revolutions.

NOTE — The cork lining shall be replaced only when it appears to be severely worn out or soiled.

5.2 Template for Cutting Specimens — *See* Fig. 1.



All dimensions in millimetres.

FIG. 1 TEMPLATE FOR TEST SPECIMENS

5.3 Rubber Tubes — of 150 mm length, 32 mm outer diameter and 3·2 mm wall thickness, having Shore A hardness of 55 to 60 degrees.

5.4 Specimen Mounting Accessories — comprising jig, metal cylinder, etc, as shown in Fig. 3.

5.5 Photographic Rating Standards — A set of 5 photographs, 110 × 95 mm in size, numbered as 1 to 5 showing varying degrees of pilling from ' very severe pilling ' to ' no pilling ', as given in Appendix A.

6. PREPARATION OF TEST SPECIMENS

6.1 Place the fabric facing downwards on a plain surface and on it place the template (*see* Fig. 1) with its longer edges along the weft direction.

*Method for conditioning of textiles.

Draw lines with the help of a pencil around the edges and in the slits of the template. Then cut the fabric along the outer lines so that a sample measuring 125 × 500 mm is obtained.

6.2 Fold the sample with the face inwards until the longer edges touch each other and sew exactly along the inner pencil lines (*see* Fig. 2).

NOTE — This ensures that all specimens of one type of fabric have the same tension when finally mounted upon rubber tubes.

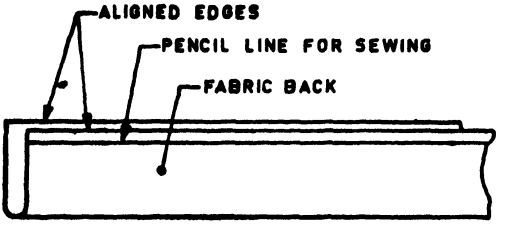


FIG. 2 SPECIMEN DURING PREPARATION

6.3 Cut from the sewn sample 4 specimens along the length, each 125 mm long. Turn the specimens inside out so that the face side of the fabric is outside.

7. MOUNTING OF TEST SPECIMENS

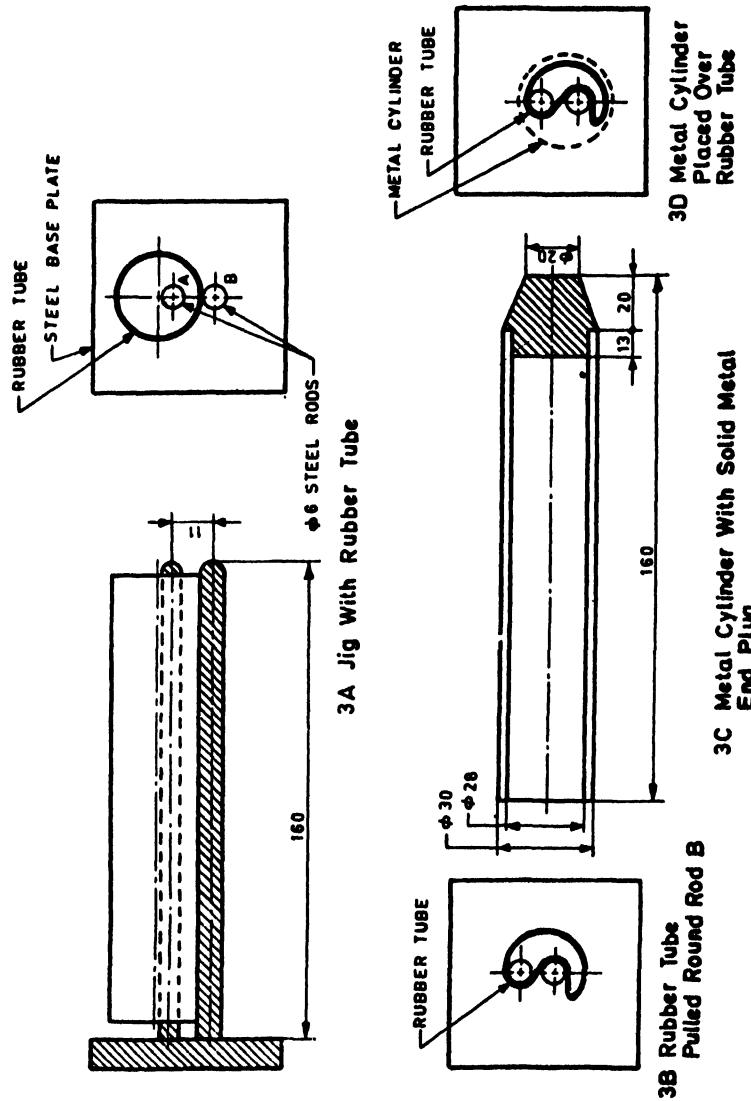
7.1 Take a rubber tube (**5.3**) and the specimen mounting accessories (**5.4**). Place the rubber tube over the rods (*see* Fig. 3A) of the jig. Pull the tube around rod B (*see* Fig. 3B) and push the hollow metal cylinder with a tapered end plug (*see* Fig. 3C) over the folded rubber tube (*see* Fig. 3D). Push the fabric specimen over the metal cylinder (*see* Fig. 3E) and then withdraw the cylinder with a turning motion leaving the collapsed rubber tube surrounded by the test specimen (*see* Fig. 3F). Withdraw the rubber tube from the jig and allow it to recover to its original circular configuration with the fabric specimen wrapped around it under even tension (*see* Fig. 3G).

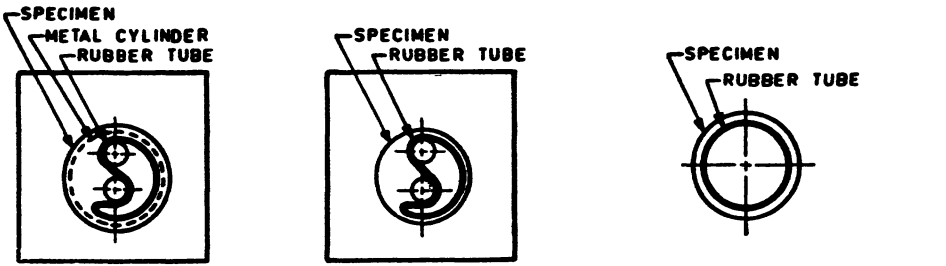
NOTE — To prevent fraying of cut ends of the specimen, cover the cut ends with adhesive transparent tape (12 mm wide), wound round the tube, overlapping the fabric on each end by about 6 mm.

7.2 Prepare at least 4 such test specimens.

8. PROCEDURE

8.1 Clean the boxes thoroughly. Place four mounted test specimens in each box and close the boxes. Set the machine for 18 000 revolutions. Start the machine and let it run till it automatically stops.


RUBBER TUBE
STEEL BASE PLATE
A
B
Φ6 STEEL RODS
11
160
3A Jig With Rubber Tube
METAL CYLINDER
RUBBER TUBE
3D Metal Cylinder Placed Over Rubber Tube
Φ20
20
13
160
Φ30
Φ28
3C Metal Cylinder With Solid Metal End Plug
RUBBER TUBE
3B Rubber Tube Pulled Round Rod B



3E Specimen Drawn Over The Metal Cylinder

3F Metal Cylinder Withdrawn, Leaving Specimen Outside Folded Rubber Tube

3G Mounted Specimen After Withdrawal From Jig

All dimensions in millimetres.

FIG. 3 SPECIMEN MOUNTING PROCEDURE

8.2 Take out the specimens and compare them with the photographic rating standards.

9. EVALUATION

9.1 Evaluate the test specimens against the photographic rating standards given in Appendix A in a well-lighted place avoiding glare and report the ratings separately for each specimen.

NOTE — Photographic rating standards show the following extents of pilling:

Rating 1 Very severe pilling

Rating 2 Severe pilling

Rating 3 Moderate pilling

Rating 4 Slight pilling

Rating 5 No pilling

In each case the specimen may or may not also become hairy, but any hairiness of the fabric is not, however, taken into account in the assessment. If the fabric becomes hairy, the letter H be added after the numerical value of its rating, such as 1 H or 2 H. Provision may also be made for rating the specimens as 1-2, 2-3, etc, according as the rating falls between 1 and 2, 2 and 3, etc.

10. REPORT

10.1 The report shall include the following information:

a) Type of fabric,

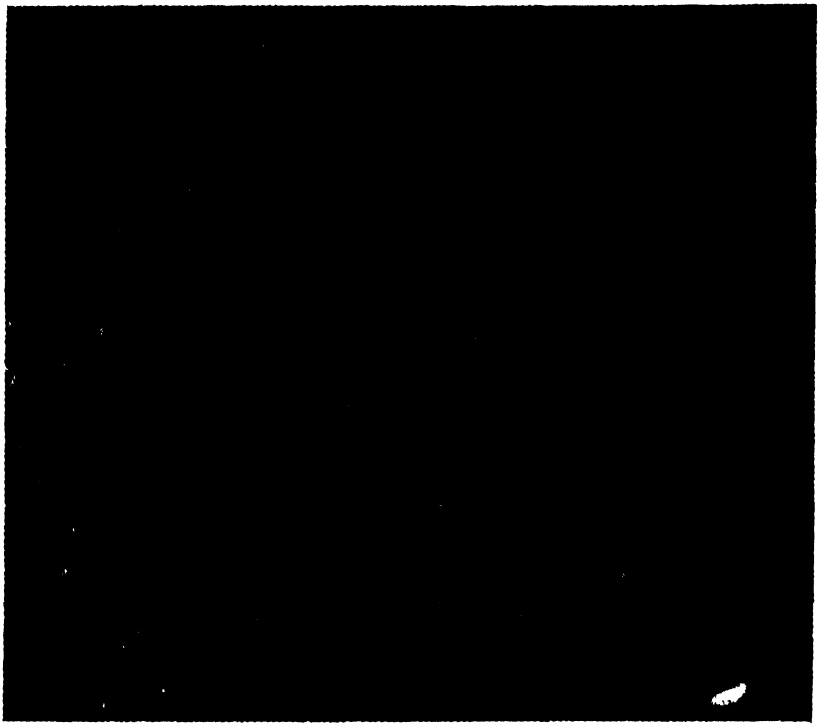
b) Number of specimens tested, and

c) Rating of each specimen.

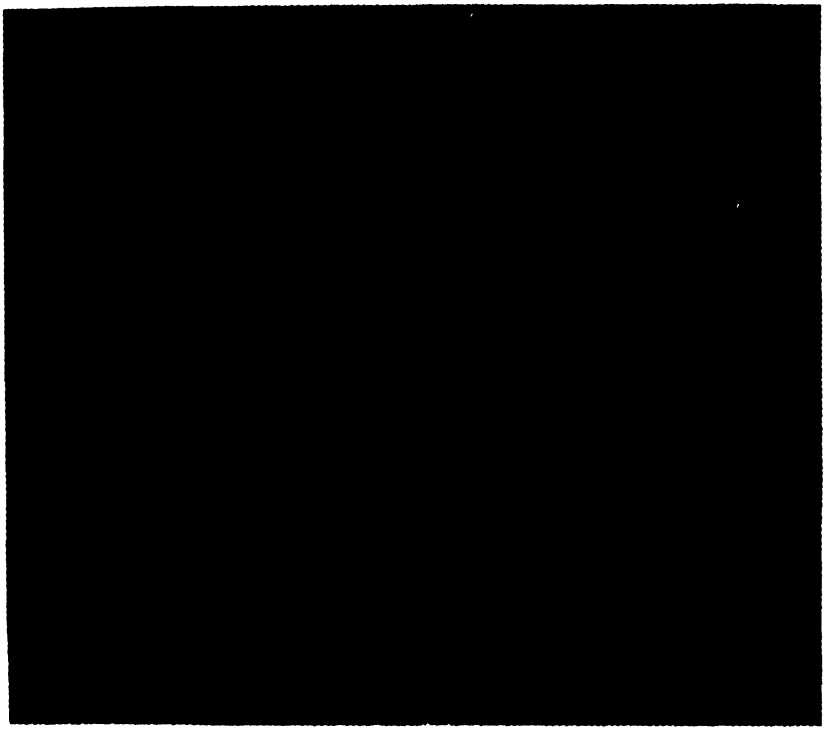
APPENDIX A

(*Clauses* 5.5, 8.2 *and* 9.1)

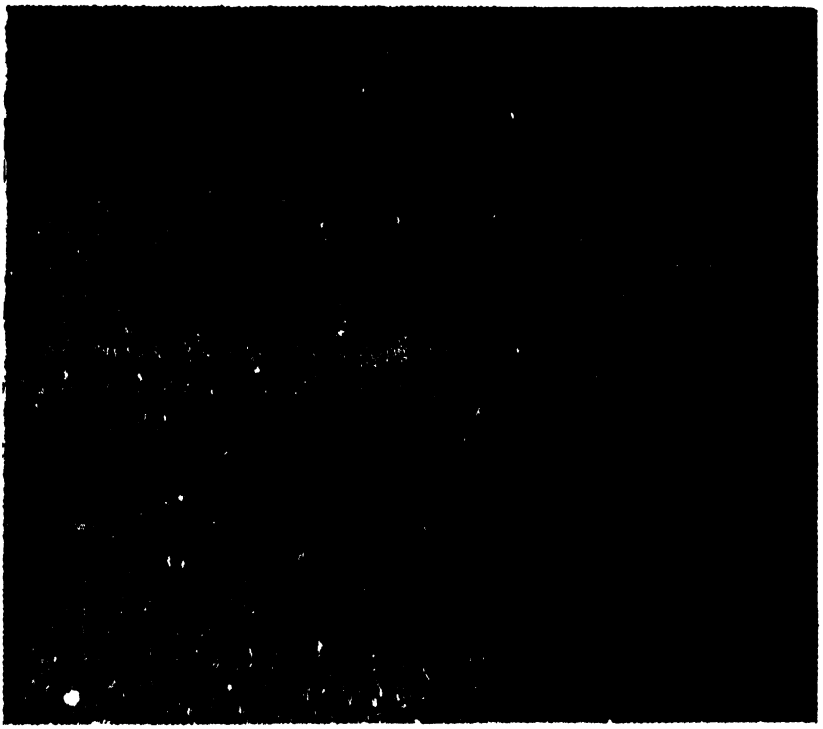
PHOTOGRAPHIC RATING STANDARDS FOR PILLING



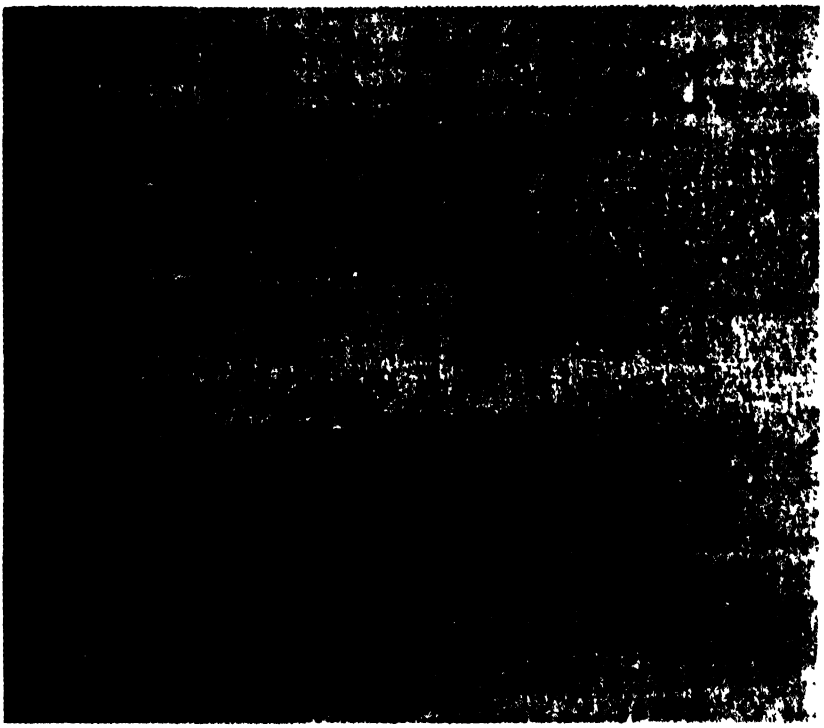
RATING 1 VERY SEVERE PILLING



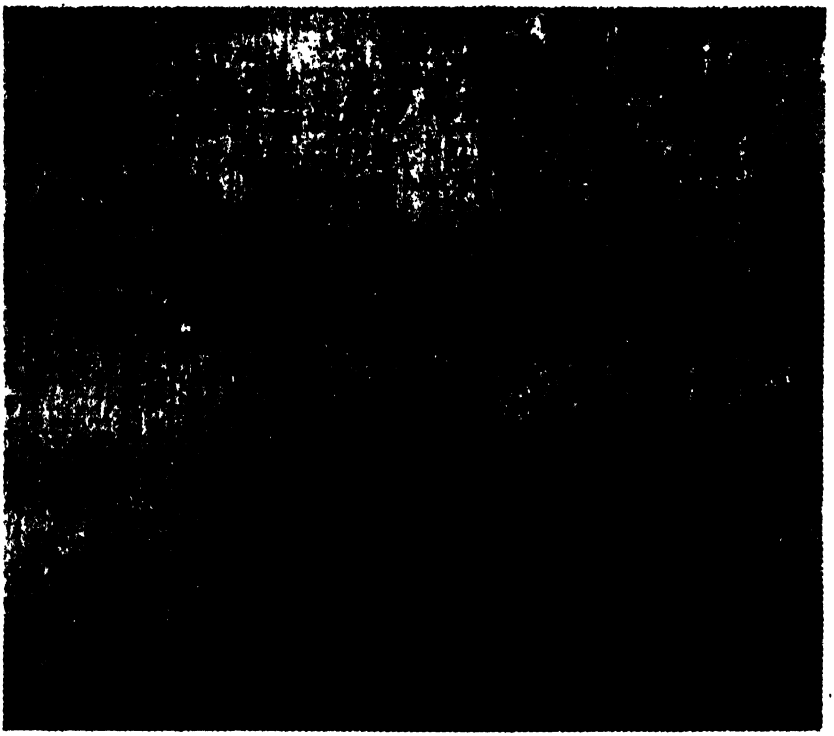
RATING 2 SEVERE PILLING



RATING 3 MODERATE PILLING



RATING 4 SLIGHT PILLING



RATING 5 NO PILLING

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